

CLAIMS

What is claimed is:

1. An image sensor outputting different amount of data according to different resolution modes, the image sensor comprises:
 - 5 a plurality of photo diodes for converting received optical signals into charges;
 - three sets of transfer gates for moving out the charges on the photo diodes;
 - three shift registers including a first, a second and a third shift registers for receiving the charges moved out from the transfer gates, respectively, and for removing the charges according to two sets of control signals;
 - 10 a floating diffusion node for receiving the charges on the first, the second and the third shift registers to generate electrical signals;
 - a charge control unit for controlling whether the output charges from the first, the second and the third shift registers are passed onto the floating diffusion node;
 - 15 a clamp for receiving the electrical signals generated by the floating diffusion node and maintaining the level within a range; and
 - an output buffer unit for receiving the signals from the clamp and generating an output signal.
2. The image sensor of claim 1, wherein the charge control unit comprises:
 - 20 a first charge control switch for controlling whether the output charges on the first shift register are passed onto the floating diffusion node;
 - a fourth shift register controlled by the first set of control signals for temporarily storing the charges on the second and third shift registers;
 - a second charge control switch for controlling whether the output charge on the

- third shift register are passed onto the fourth shift register; and
a third charge control switch for controlling whether the charges on the fourth
shift register are passed onto the floating diffusion node.
3. The image sensor of claim 2, wherein the plurality of photo diodes are divided
5 into two sets in equal numbers and are disposed in an upper and a lower rows in
an interposed way.
4. The image sensor of claim 3, wherein the first shift register receives data of a set
10 of photo diodes and is controlled by the first set of control signals, and the second
and third shift registers receive data of the other set of photo diodes and are
controlled by the second set of control signals.
5. The image sensor of claim 4, wherein when the resolution mode is set in the
highest resolution mode, the first, second and third charge control switches are
turned on to output the data on the three shift registers, and the frequency of the
15 first set of control signals are set as 1/2 of the output signal's frequency and the
frequency of the second set of control signals are set as 1/4 of the output signal's
frequency.
6. A scanner control method, where the scanner employs an image sensor that
provides different amount of data according to different resolution modes, the
control method comprising the steps of:
20 reading a scanning resolution selected by a user;
setting a resolution mode by comparing the read scanning resolution and the
highest optical resolution;
generating control signals, which generates shift register control signals, switch
25 control signals and other related control signals in accordance with the
resolution mode; and

- scanning a document according to the control signals.
7. The method of claim 6, wherein the image sensor is the image sensor described in
claim 1.
8. The method of claim 7, wherein the scanner is set in the highest resolution mode
5 when the resolution is greater than 1/2 of the highest optical resolution, the
scanner is set in the 1/2 resolution mode when the resolution is between 1/4 and
1/2 of the highest optical resolution, and the scanner is set in the 1/4 resolution
mode when the resolution is not greater than 1/4 of the highest optical resolution.
9. The method of claim 8, wherein the step of generating control signals generates
10 two sets of shift register control signals and three switch control signals.
10. The method of claim 9, wherein when the scanner is in the highest resolution
mode, the three switch control signals are enabled and the frequency of the first
set of control signals are set as 1/2 that of the output signal of the image sensor,
and the frequency of the second set of control signals are set as 1/4 that of the
15 output signal.
11. The method of claim 9, wherein when the scanner is in the 1/2 resolution mode,
the first switch control signal is enabled and the third switch control signal is
disabled, and the frequency of the first set of control signals are set as same with
that of the output signal of the image sensor, and the frequency of the second set
20 of control signals are set as 1/2 that of the output signal.
12. The method of claim 9, wherein when the scanner is in the 1/4 resolution mode,
the first and second switch control signals are disabled and the third switch
control signal is enabled, and the frequency of the first and second set of control
signals are set as same with that of the output signal of the image sensor.
- 25 13. An image sensor outputting different amount of data according to different

resolution modes, the image sensor comprises:

a plurality of photo diodes for converting received optical signals into charges;

a plurality of sets of transfer gates for moving out the charges on the photo diodes;

a plurality of shift registers for receiving the charges moved out from the transfer

5 gates, and removing the charges according to control signals;

a floating diffusion node for receiving the charges on the first, the second and the

third shift registers to generate electrical signals;

a charge control unit for controlling whether the output charges from the shift
10 registers are passed onto the floating diffusion node;

a clamp for receiving the electrical signals generated by the floating diffusion
node and maintaining the level within a range; and

an output buffer unit for receiving the signals from the clamp and generating an
output signal.

14. The image sensor of claim 13, wherein the image sensor has two sets of shift
15 registers and two sets of transfer gates.

15. The image sensor of claim 14, wherein the charge control unit comprises a charge
control switch for controlling whether the output charges on one of the shift
register are passed onto the floating diffusion node.